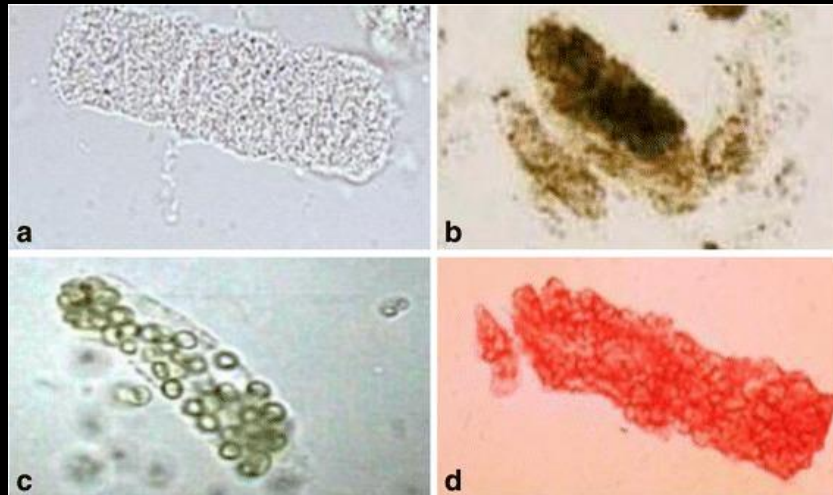


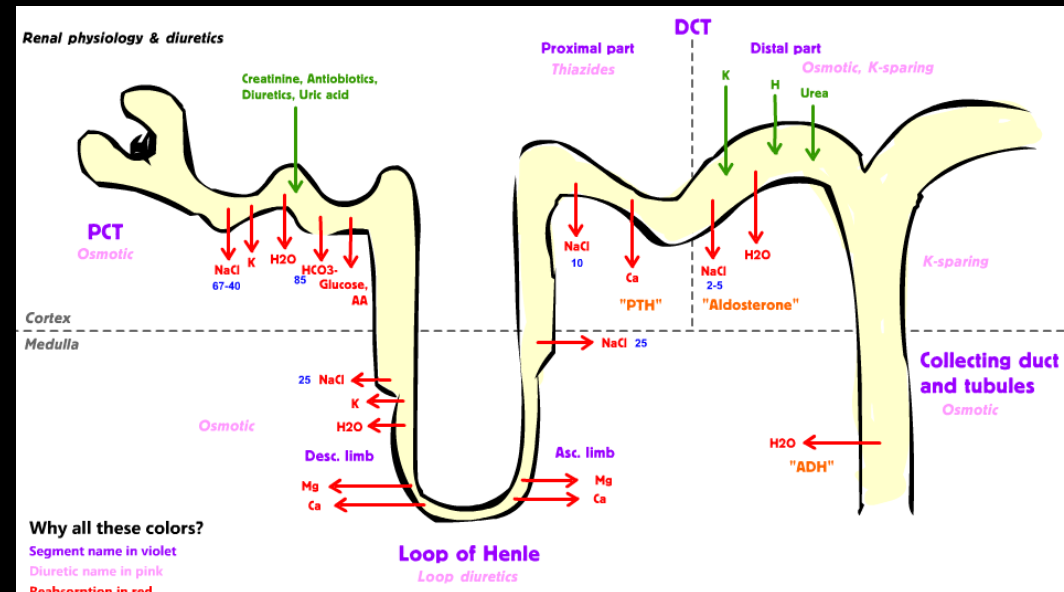
High Yield Renal Review

Part 1: Rapid Review

By Tate, Mike, Cory



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Strudel Renal Review

By Tate, Mike, Cory

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Renal Anatomy & Physiology

Filtration:

Removes waste (urea/creatinine) and excess minerals (sodium, potassium, phosphorus)

Regulate fluid balance:

ADH and aldosterone

Acid-Base balance:

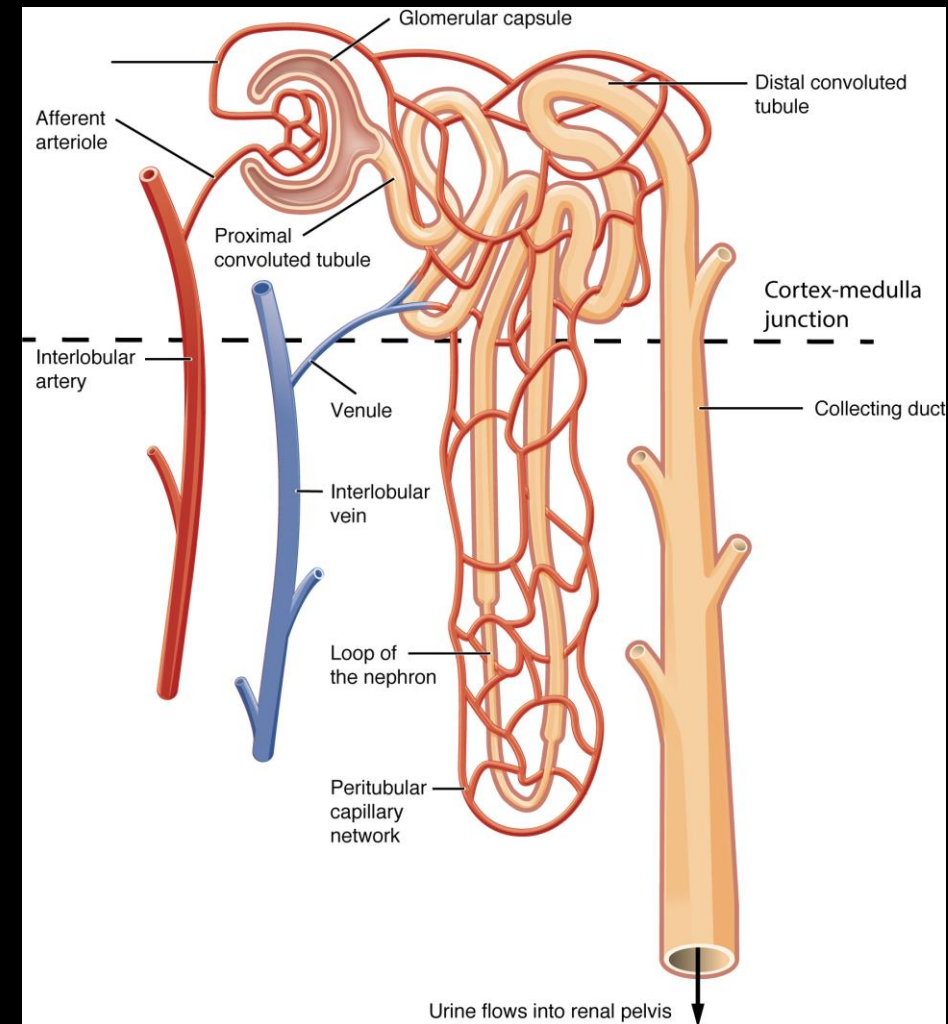
Excrete acids or bases as needed

Hormone production:

EPO, stimulates RBC production and renin, regulates blood pressure

Vitamin D activation:

1 α -hydroxylase, necessary for bone health and other bodily functions



Renal Pharmacology – Diuretics

Carbonic anhydrase inhibitors (acetazolamide, methazolamide) – block carbonic anhydrase in PCT leading to increased excretion of Na, bicarb, and Cl

- Side effects?

Type II (Proximal) RTA (NAGMA), paresthesias/neuropathy

- Unique Uses?

Acute Glaucoma, Altitude sickness (NOT HACE/HAPE), Idiopathic Intracranial HTN, alkalinize urine to help with cysteine stones (not good for calcium phos stones)

Osmotic Diuretics (mannitol, urea) – increase osmotic pressure within nephron

- Uses? Decrease intracranial pressure

Renal Pharmacology – Diuretics

Loop diuretics (furosemide, torsemide, bumetanide) – block Na-K-Cl transporter in the thick ascending limb of LoH, increases excretion of these ions resulting in increased urine production and decreased blood volume

- Side effects?

Hypokalemia, hypomagnesemia, hyperuricemia/gout, ototoxicity, sulfonamide toxicity/allergy (except ethacrynic acid)

Thiazide diuretics (HCTZ, chlorthalidone, indapamide) – block Na resorption in the DCT, increases urine output

- Side effects?

Hypokalemia, hyponatremia, hypercalcemia, hyperglycemia, hyperlipidemia, hyperuricemia, pancreatitis

- Good time to use?

HTN (1st line), osteoporosis, calcium stone disease

- What NOT to use it with?

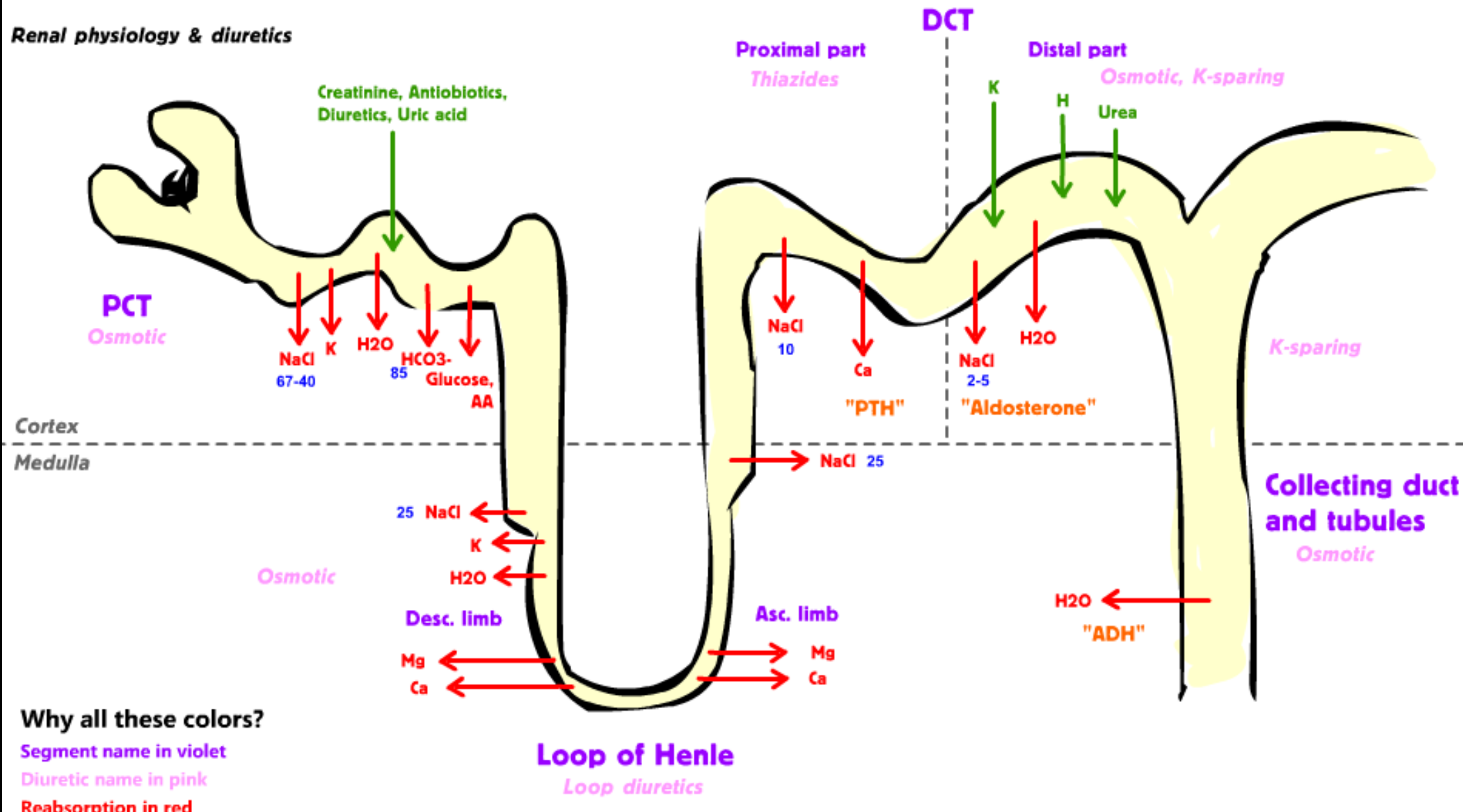
LITHIUM – INCREASES RISK OF NDI, otherwise it's the tx for NDI...

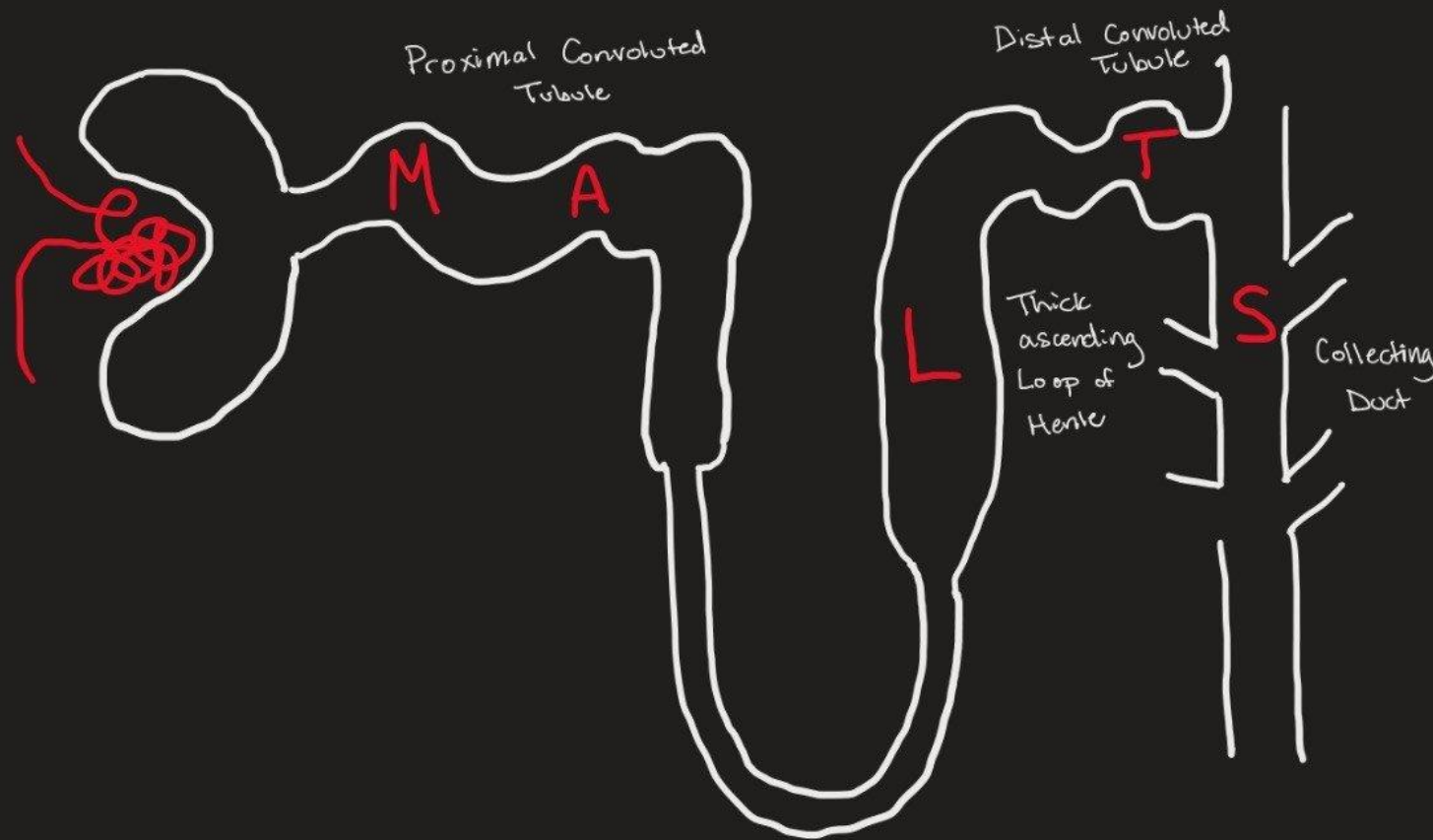
Potassium-sparing diuretics (spironolactone, eplerenone, amiloride) – block action of aldosterone in DCT, increased Na excretion and decreased K excretion

- Side effects?

Hyperkalemia, spironolactone = gynecomastia (anti-androgen effect)

Renal physiology & diuretics





Mannitol
Acetazolamide
Loop diuretics
Thiazides
Spironolactone

(Some) Nephrotoxic Medications

Acyclovir?

Crystalline nephropathy

Aminoglycosides?

ATN

Gadolinium?

Systemic Fibrosis after MRI contrast, joint contractures -> organ failure, high mortality

Platin-based chemo, how do we prevent it?

Amifostine

Contrast – Pathophysiology? Prevention?

Vasoconstriction + direct cytotoxicity, Pre-hydration

Tenofovir?

Fanconi Syndrome (Type II RTA, NAGMA with urine pH >5.5 early on due to bicarb excretion)

NSAIDs – pathophysiology?

AIN, can cause AKI via constriction of afferent arteriole via prostaglandin inhibition

BONUS: Cyclophosphamide

Hemorrhagic cystitis, prevent with MESNA

Acute Kidney Injury

Definition

Rapid decline in renal function characterized by increase in serum creatinine:

- increase by 0.3 within 48hrs
- 1.5x baseline within 7d
- UOP <0.5mL/kg for >6hrs

Causes of AKI (3)

Prerenal, renal, postrenal

Prerenal etiologies?

Volume loss, decrease CO, hypotension, fluid overload

Renal etiologies?

GN, vasculitis, interstitial disorder (meds, infection, disease), ATN

Postrenal?

Intrarenal(stones/proteins) and extrarenal (pelvis, ureter, bladder, urethra)

Acute Kidney Injury

You think its pre-renal, next best step?

Hypovolemic – bolus challenge

Hypervolemic – diurese

You think its intra-renal...now what?

Supportive care. Stop nephrotoxic medications. Fluids, steroids if immune-mediated, plasma-exchange for TTP/HUS

Special case: tense digits, dysphagia, hx of hypothyroid and now has MAHA + bad AKI

Dx?

Scleroderma Renal Crisis

Tx?

ACE-INHIBITOR (captopril usually)

You think its post-renal, next best step?

Catheterization, maybe urology consult for nephrostomy

Most common cause of death in AKI?

Infection – impaired humoral and cellular immunity

Uremia...what are we worried about?

Platelet dysfunction (counts normal), immune dysfunction (humoral and cellular), pericarditis, encephalopathy

If you see any of these... Next best step?

DIALYSIS

Renal Pathology (continued)

70-year-old male w/ hx of cirrhosis presents w/ worsening ascites and abdominal pain. Exam significant for tense ascites and mild asterixis. Labs show Cr of 2.8, which is significantly increased from baseline. Cr does not improve despite giving IV normal saline. Dx?

Hepatorenal syndrome

What is the pathophysiology?

Splanchnic vasodilation decreases renal perfusion

Next step in management?

Octreotide (reduces splanchnic vasodilation) and diuretic (3rd spacing), maybe vasopressin

Definitive treatment?

Liver transplant, without it, true HRS has an estimated life-span of 2 weeks...

Expected lab findings in prerenal AKI – classic question

BUN/Cr ratio

>20:1 (Kidney attempts to conserve water and salt, results in increased urea reabsorption)

FeNa

<1% (Kidney sees low blood flow, attempts to conserve salt and water)

Urine sediment

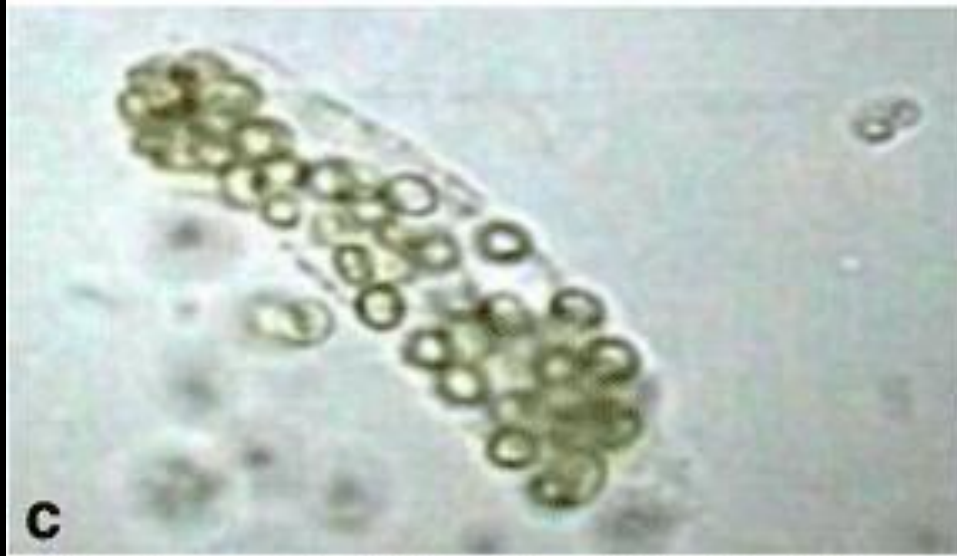
bland (extrarenal etiology)

Renal complications if untreated?

ATN – prolonged ischemia

If this patient were on a diuretic would FENa still be useful?

No, diuretics increase sodium excretion and falsely elevated UNa, measure FEUrea instead



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Renal Pathology Rapid Review

30-year-old female presents for evaluation of fatigue and a diffuse maculopapular rash that developed 2 days ago. She recently completed a course of antibiotics for a sinus infection but is otherwise healthy. Labs significant for Cr of 1.9. UA shows many WBCs, 1+ protein, and some RBCs.

Dx?

AIN – classic finding = "sterile pyuria"/eosinophiluria

Other common clinical features of this condition?

Fever, polyarthralgia, eosinophilia, rash, flank pain

Tx?

Discontinuing offending medication – whichever one they give you in the question...often abx

Systemic Glucocorticoids

Renal Pathology Rapid Review

20-year-old woman presents to ED after experiencing a 5-minute generalized-tonic-clonic seizure. Urine sample collected in dark brown. UA shows trace proteinuria, 3+ blood, and 1-2 RBCs.

Etiology of UA findings?

Rhabdomyolysis - myoglobin is nephrotoxic and can damage renal tubules

UAs look at the globin group – will detect both myoglobin and hemoglobin as "blood"

Lab findings? (electrolytes, CK)

Hyperkalemia, hyperphosphatemia, hypocalcemia

BUN/Cr

<20/1

FENa

>2%

Urine sediment?

Muddy brown "pigmented" casts (ATN), urine is classically dark

Management?

Fluid and electrolyte monitoring, resolve with supportive care

Patient with gross hematuria...now what?

First step in management?

UA

What information does UA provide in determining etiology of bleed

Glomerular vs nonglomerular vs infectious

Glomerular cause...UA findings?

Dysmorphic RBC, RBC casts, proteinuria

Next step?

Evaluate for intrinsic renal disease, serology (ANA, ANCA, complement, anti-GBM), renal biopsy, 24-hour urine protein

Non-glomerular findings?

Normal shaped RBCs, no casts, no proteinuria, neg culture

Next best step?

Imaging US vs. Non-Con CT (stones), CT (trauma), cystoscopy (bladder cancer), ect.

Infection UA findings

Pos leukocyte esterase, pos nitrites (UTI), pos culture

Next step?

Treat infection, follow up

Patient with gross hematuria...now what?

EXTRAORDINARILY HIGH YIELD CASE - 65y.o. smoker with painless hematuria OR vague sx of frequency/urgency. You get a UA and it shows blood but not much else...

Next best step?

CYSTOSCOPY – this is how they present bladder cancer

Risk factors?

Smoking/aniline dyes/cyclophosphamide = adenoCA, Schistosomiasis = SCC

Hematuria (continued)

70-year-old male presents for evaluation of blood in urine. No dysuria, urgency, or frequency. No abdominal pain, fevers, chills. There is painless palpable mass in right flank. UA shows >3 RBCs/HPF, trace proteinuria, no leuks, no nitrites.

Likely dx?

Kidney cancer – RCC

Risk Factors?

SMOKING, VHL Syndrome (hemangioblastomas, b/l RCC, pheochromocytoma)

Next step?

- **CT scan/abdominal US, determine benign vs malignant mass and staging**
 - **Suspicious features = >1cm in size, thick/irregular walls, calcifications**
 - **- If simple cyst, next best step = Reassurance**
 - **Note – Any time you have a likely malignancy...its often a good choice to do a CT for staging purposes**

Tx/Confirmation?

Partial vs. Complete nephrectomy, typically do not biopsy d/t risk of seedingw (Also the case with testicular/ovarian malignancies)

Primary Glomerular Disorders

11-year-old female with history of recent URI presents for evaluation of periorbital and LE edema and fatigue. UA sig for 4+ proteinuria, no RBCs, no casts.

Dx?

Minimal change disease, clinical dx in children does not require kidney biopsy

Pathophysiology?

Nephrotic syndrome, most common in children, effacement of foot processes d/t cytokine damage

Tx?

Steroids

40-year-old white female with hx of chronic Hep C infection presents with periorbital edema, weight gain, and fatigue. UA shows proteinuria without RBCs or casts. BP 150/100 mmHg. Glomerular capillary walls appear thickened

Dx?

Membranous glomerulonephritis

Etiology?

Infection (Hep B, Hep C, syphilis), lupus, idiopathic, neoplasms – So next best test may be hepatitis testing/cancer screening

Primary Glomerular Disorders

29-year-old female presents for evaluation of hematuria. She recently recovered from a cough and runny nose 2-days ago. UA shows 3+ RBCs, 1+ proteinuria, and RBC casts

Dx?

IgA nephropathy

Expected findings on electron microscopy?

Mesangial deposition of IgA and C3

How is this clinical presentation different from post-strep glomerulonephritis?

PSGN typically occurs weeks after URI (strep throat, +ASO titer/DNAse B) or skin infection (strep pyogenes)

RENAL RAPID FIRE

Nephritic syndrome + eye problems + SN hearing loss?

Alport syndrome (Type IV Collagen Defect)

40y.o. woman with hx of hypothyroidism, rash on her face, arthralgias now has nephritic syndrome?

Lupus Nephritis, FULL HOUSE STAIN

45y.o. with HIV, doesn't take ART, now has tons of proteinuria?

HIV-Associated Nephropathy, "Collapsing FSGS"

25y.o. with Sickle Cell Disease has flank pain, hematuria, increased medullary hyperechogenicity on U/S?

Renal Papillary Necrosis

30y.o. female has increased urinary frequency and pelvic pain relieved by urination, cystoscopy shows inflammatory patches on the bladder wall?

Interstitial cystitis

Pregnant woman gets a routine UA and it shows bacteria. Next best step?

TREAT (fosfomycin, cephalosporin, nitro OK unless close to due date, bactrim if in the middle of pregnancy)

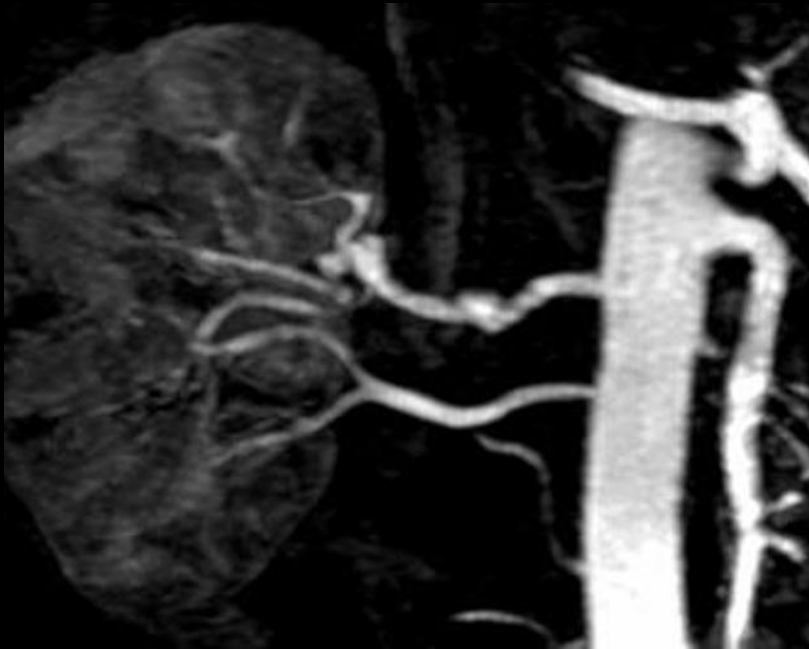
Didn't treat it, now you have fever, N/V, flank pain.

Dx? Pyelonephritis, Tx? HOSPITALIZE AND IV 3rd GEN CEPHALOSPORIN

- May even do nitrofurantoin for the rest of pregnancy OR just monthly surveillance UA/Cx

Renal Review Part 2: High Yield Cases and more

By Tate, Mike, Cory



Schubert R, Fibromuscular dysplasia of a duplicated renal artery. Case study, Radiopaedia.org (Accessed on 29 Aug 2024) <https://doi.org/10.5334/rID-14346>



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Infection

Patient presents with N/V, flank pain, and fever following 3d of UTI sx. Dx?

Pyelonephritis

Tx?

Ceftriaxone if inpatient, Cipro if outpatient (depends on oral tolerance)

Complications?

Perinephric/Renal abscess

How will it present?

Persistent fever despite appropriate treatment

Treatment?

Drainage if >3cm, Pip-Tazo +/- Gent +/- Vanc empirically

Special patient group that is always admitted?

PREGNANCY

What's going on here?

60-year-old man with newly diagnosed nephrotic syndrome presents with right flank pain and hematuria. Normal vitals. Exam significant for R flank tenderness, otherwise normal. UA shows many RBCs but is otherwise normal. Ultrasound shows right kidney is enlarged compared to left.

Dx?

Renal vein thrombosis

Pathophysiology?

Increased loss of ATIII = hypercoagulable state

Next step in management?

CT scan or MR angiography to confirm dx

Tx?

Anticoagulation (Thrombectomy if AKI present)

35 y.o. male, IVDU, fevers/chills for 2 weeks. You hear a systolic murmur over the LLSB. He's also presenting with flank pain, so you get a CT and see this: Dx?



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High Yield Hypertension

31-year-old male with hx of HTN presents with right flank pain and hematuria. B/l masses palpated over flank. US shows b/l cystic changes of the kidneys

Dx?

Autosomal-Dominant Polycystic Kidney Disease

Pathophysiology?

Cystic expansion leads to renal dysfunction and localized ischemia, resulting in increased renin release (HTN), cyst rupture can cause hematuria

Dx?

US – multiple cysts on kidney

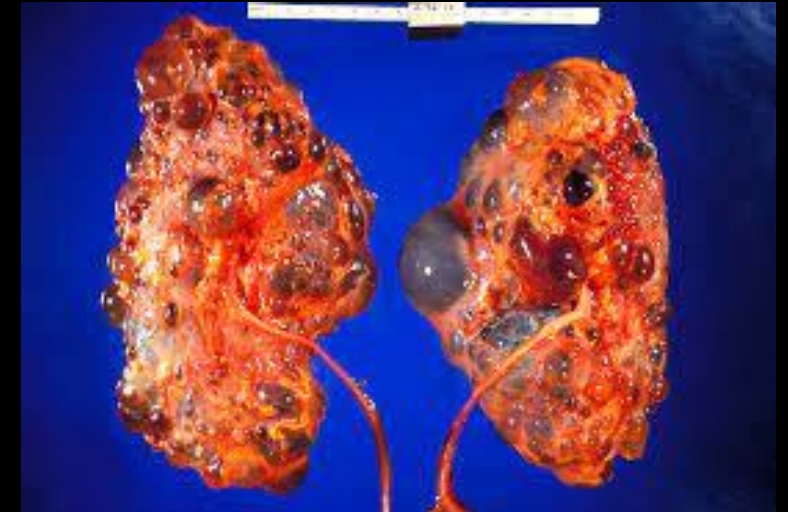
Tx?

No curative therapy, manage HTN with ACE inhibitors (directly impact

RAA pathway)

Extra-renal complications?

Nephrolithiasis, intracerebral berry aneurysm (up to 20%), cyst in other organs (liver, pancreas)



CDC/ Dr. Edwin P. Ewing, Jr., Public domain, via Wikimedia Commons

High Yield Hypertension

75 y.o. with hx of CAD and PAD presents with HTN despite tx with 3 antihypertensives and an abdominal bruit?

Dx?

Renal artery stenosis

Next best step?

Duplex U/S vs. Angiography

Tx?

ACE inhibitors, UNLESS >30% drop in eGFR/increase in Cr by 0.5
May need revascularized with STENT

35 y.o. woman with bruit in her neck and treatment resistant HTN?

Dx?

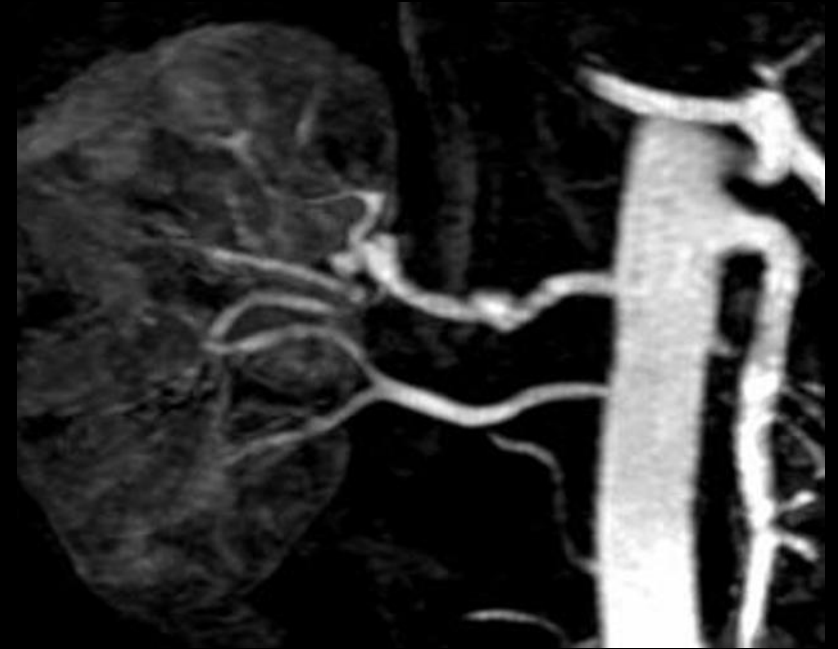
Fibromuscular dysplasia

Next best step?

Duplex U/S vs. angiography

Tx?

ACE inhibitor, maybe balloon angioplasty WITHOUT STENT



Schubert R, Fibromuscular dysplasia of a duplicated renal artery. Case study, Radiopaedia.org (Accessed on 29 Aug 2024) <https://doi.org/10.53347/rID-14346>

Stones

Patient with known Crohn's disease presents with a sx of a kidney stone

Type of stone?

Calcium oxalate

Pathophysiology (HIGH YIELD)

Ileal disease -> fat malabsorption -> Calcium binds fat instead of oxalate -> increased free oxalate in blood -> binds calcium and ends up in the urine

Tx?

DON'T restrict calcium, hydrate, alkalinize urine with pot. citrate

Stones

Patient with chronic diarrhea and hx of gout presents with severe left flank pain. UA shows many RBCs and urine pH 4.2 (N 5-6). Stone is not visualized on CT scan.

Dx?

Uric acid stone

Tx?

Potassium citrate (urine alkalization), hydration

34 year old female with hx of recurrent UTI's presents with fever and flank pain. UA shows moderate RBCs and urine pH 8.2 and crystals that appear like "coffins"

Dx?

Struvite (Magnesium Ammonium Phosphate) stones

Pathophysiology?

Urease producing bacterium (Proteus)

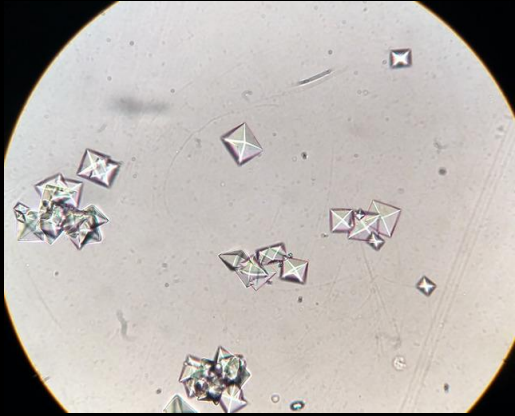
Expected Ultrasound findings?

Large staghorn in renal pelvis

Tx?

Antibiotics, stone removal usually required (surgery), urease inhibitor if recurrent problem

Stones



Calcium oxalate

pH?



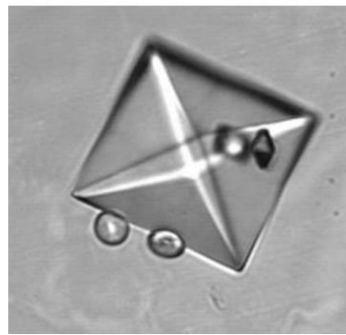
Uric acid



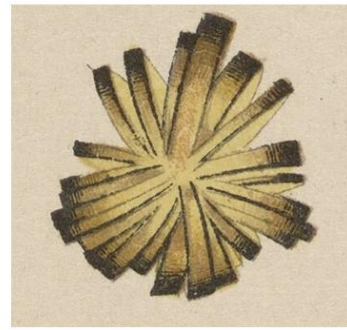
Struvite (magnesium ammonium phosphate)



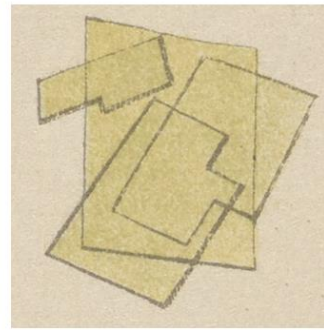
Cystine



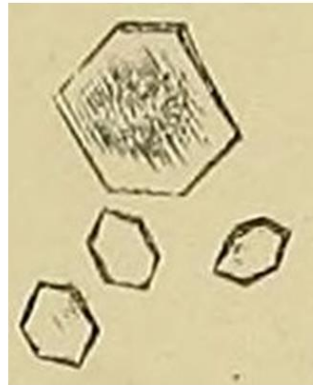
Calcium oxalate



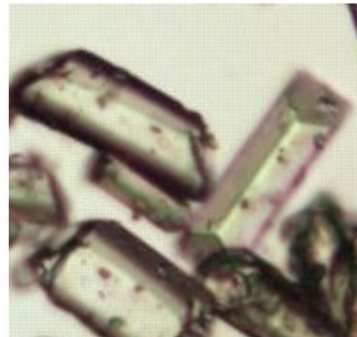
Calcium phosphate



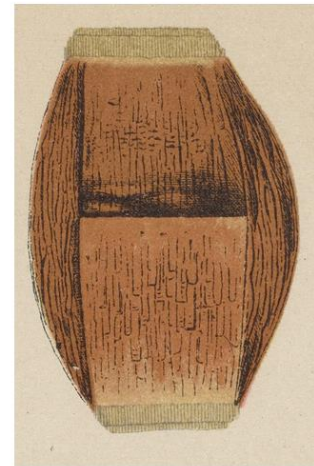
Cholesterol



Cystine



Struvite



Uric acid

Mikael Häggström, M.D. Author info - Reusing images- Conflicts of interest: NoneMikael Häggström, M.D.- using source images by multiple authors (see above)., CC BY 4.0 <<https://creativecommons.org/licenses/by/4.0>>, via Wikimedia Commons

Chronic Kidney Disease/Complications

Anemia due to lack of EPO production:

Tx?

EPO

HY side effect?

HYPERTENSION

Vit D deficiency due to lack of 1-alpha-hydroxylase dysfunction:

What do you supplement?

1,25-OH-Vitamin D (calciTRIol)

Most common cause of death?

CARDIOVASCULAR DISEASE

So what do you do?

Risk Factor Modification



Lance Armstrong EPO investigation

<https://www.cnn.com/2012/08/23/sport/lance-armstrong-investigation/index.html>

Chronic Kidney Disease/Complications

70-year-old man with history CKD stage III presents for evaluation of a PAINFUL necrotic skin lesion over his right LE. Labs show no change in Cr, hypercalcemia increased from previous lab 6 months ago, hyperphosphatemia, and hyperkalemia

Dx of skin lesion?

Calciophylaxis

Pathophys?

Hyperphosphatemia and hypercalcemia precipitates in blood vessels leading to calcification and overlying necrosis of skin



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Chronic Kidney Disease/Complications

ESRD patient presents with pain in their hips, arms, legs. Reproduced on palpation of the bones.

Dx?

Renal Osteodystrophy (Secondary Hyperparathyroidism, osteitis fibrosa cystica)

Pathophysiology (Classic Arrow Question):

Phosphate?

Calcium?

PTH?

Vitamin D?

High, Low, High, Low



Greif E. Case study, Radiopaedia.org (Accessed on 29 Aug 2024) <https://doi.org/10.53347/rID-27368>

Dialysis

What types are available?

Hemodialysis and peritoneal dialysis

How do they work?

Hemodialysis pumps blood through dialyzer where fluid and electrolyte diffuse across semipermeable membranes and waste is removed, blood returns to body.

Peritoneal dialysis uses peritoneum as dialysis membrane, abdomen filled with hyperosmolar solution that draws fluid and solutes from peritoneal vasculature, abdomen is drained. (WATCH FOR SBP)

Emergent indications? Mnemonic?

AEIOU

Acidosis (intractable, usually <7.1 or $\text{HCO}_3^- < 12$), Electrolytes (persistent hyperkalemia >6.5), Intoxications (PEG, methanol, aspirin), overload (refractory to diuretic), uremia (clinical presentation)

Nonemergent indications?

Sx of uremia (N/V, AMS, encephalopathy, pericarditis, ect), in CKD as bridge to transplant

Renal Transplant

- Post-Transplant Therapy

- Tacrolimus (calcineurin inhibitor), Mycophenolate, Prednisone
 - Tacrolimus – nephrotoxic, can cause HTN
 - Chronic prednisone – bone disease (AVN, osteoporosis), infections, adrenal insufficiency if withdrawn

Acute Rejection

- Within 6 months of transplant: Fever, pain, etc.
- Characterized by **lymphocytic infiltrate** on biopsy
- Tx = **High dose steroids, maybe anti-thymocyte globulin**

Chronic Rejection

- >6 months after transplant
- Characterized by **interstitial fibrosis and obliteration of vessels/glomerular sclerosis** on bx
- Irreversible, no tx except replacement

Incontinence - Extremely HY

Case: 60 y.o. F, G5P5 pees when she sneezes.

Dx?

Stress Incontinence

Tx?

PFMT, Lifestyle changes, Pessary, Midurethral sling

Case: 70y.o. M with long hx of uncontrolled DM notices near continuous drippage of urine

Dx?

Overflow Incontinence (2/2 diabetic autonomic neuropathy)

Tx?

Intermittent catheterization vs. Tamsulosin/finasteride for BPH vs. Muscarinic agonists for hypoactive detrusor

Other causes?

BPH, spinal cord injury, MS

Incontinence (continued)

Case: 65y.o. F presents with episodes of incontinence and feels like she can't get to the bathroom soon enough

Dx?

Urge Incontinence

Pathophysiology?

Overactive detrusor muscle (parasympathetic inn.)

Tx?

Oxybutinin/Tolterodine (antimuscarinics), Mirabegron (beta-3 agonist, newer)

What if its not totally clear? Next best step?

Voiding diary (incredibly HY)

A High Yield Case for Primary Care

50 y.o. male presents to the clinic. He has no known past medical history, but he came in at request of his wife after his father-in law passed from a heart attack. He reports an "American" diet with a couple Mountain Dew sodas per day. You get a POC glucose and its 275. His BP is 155/95. You are worried about complications of his newly-diagnosed T2DM...

How do we start assessing diabetic nephropathy?

Spot albumin:creatinine ratio (>30 = abnormal)

What is the pathophysiology? Pathology findings?

Glomerular hyperfiltration, K-W nodules/glomerulosclerosis

How do we prevent progression?

Manage diabetes, ACE-inhibitors/ARBs (dilates the efferent arteriole)

Electrolyte Disturbances

65-year-old man with hx of CHF presents with confusion, nausea, and malaise. He struggles to follow commands during exam which is significant for S3 heart sound, HJR, and b/l LE edema. Labs show serum sodium of 118 mmol/L (norm – 136-144)

Etiology of patients mental sx?

Hyponatremia 2/2 CHF exacerbation (Hypervolemic Hyponatremia)

Common clinical features off hyponatremia?

Neurologic sx (headache, weakness, delirium), increased ICP (seizures), GI (N/V, ileus)

Additional labs for hyponatremia?

Urine osmolality, urine sodium (should be low in hyponatremia)

Management for this patient?

3% saline (hypertonic) – indicated for severe $\text{Na}^+ < 110$ mmol/L or if symptomatic

What if not symptomatic/ >110 ? Just 0.9% NS – VERY HIGH YIELD (NS/LR/Crystalloid is often the correct answer)

Potential complication of this treatment modality?

Central pontine demyelination (osmotic myelinolysis), correct sodium 4 to 6 mEq/L in first 6 hours

Approach to Hyponatremia

First step in evaluation?

Measure serum osmolality – determine if etiology is hypertonic (hyperglycemia, mannitol), pseudo (increased protein or trigs), or true hyponatremia (vast majority of cases)

Next step in evaluation for true hyponatremia?

Assess volume status - hypovolemic, euvolemic, hypervolemic

Next step in evaluation for hypovolemic hyponatremia?

Measure urine sodium – should be low (<10), kidneys want to retain sodium in this state. If elevated (>20) think excessive diuretics or low aldo

Etiologies of euvolemic hyponatremia? How to differentiate?

SIADH and psychogenic polydipsia (2 most common), Differentiate via Water Deprivation Test (HIGH YIELD)

Etiologies of hypervolemic hyponatremia?

CHF, nephrotic syndrome, liver disease

Electrolyte Disturbances

25-year-old female with hx of bipolar disorder well controlled on lithium presents for routine evaluation. Vital signs normal. PE is unremarkable. Labs significant for sodium of 150 mmol/L. No change in diet or fluid intake.

Etiology of hypernatremia?

Nephrogenic Diabetes Insipidus 2/2 lithium use

Additional labs?

Urine volume (should be low if kidneys responding appropriately)

Urine osmolality should be >800 , as the body is not responding to ADH telling it to reabsorb water

Treatment?

Amiloride NOT thiazides like normal NDI

How can central vs nephrogenic diabetes insipidus be distinguished?

Desmopressin trial – would expect no change in urine osmolality in this case

Approach to Hypernatremia

First step in evaluation?

Volume status

Hypovolemic hypernatremia etiology?

Water loss > Na loss, diuretics, renal failure, diarrhea, sweating

Treatment?

Restore euvoemia, isotonic saline

Euvolemic hypernatremia etiology?

Loss of free water - Diabetes insipidus

Treatment?

Vasopressin, low sodium diet, thiazide diuretics, oral fluids

Hypervolemic hypernatremia etiologies?

Gain Na⁺ > gain water (uncommon), large amount of sodium bicarbonate, Cushing's, primary hyperaldosteronism

Treatment?

Furosemide (volume correction) and D5W (correct sodium (osmotic agent))

What can happen if sodium concentration is lowered too quickly?

Cerebral edema

Potassium

Hyperkalemia

Causes?

ESRD, ACE/ARBs, Spironolactone, hemolysis, TLS, NSAIDs, hypoaldosteronism, rhabdo

Presentation?

Weakness, hyporeflexia, arrhythmia

EKG findings?

Peaked T -> Wide QRS -> "Sine"

Treatment?

CALCIUM + Insulin/D50, albuterol, loops, kayexalate, dialysis

Hypokalemia

Causes?

Loop/thiazides, vomiting/diarrhea, laxatives, hyperaldosteronism, hypomagnesemia (HY)

Presentation?

Arrhythmia, weakness, hyporeflexia, constipation/ileus

EKG findings?

T wave flattening, U waves

Treatment?

Repletion: oral KCl vs. IV @ 10mEQ/hr

○ Stop the med/address the cause

Magnesium

Hypermagnesemia

Causes?

Renal disease, increased intake
(eclampsia, arrhythmia, mag
laxatives), rhabdo

Presentation

Absent DTRs and resp. Depression

Management?

Calcium gluconate/citrate, dialysis

Hypomagnesemia

Causes?

Malnutrition (EtOH), Loops,
Malabsorption, Refeeding

Presentation

Weakness, prolonged QT,
Torsades, cardiac arrest

Management?

Telemetry + replete

Calcium

Hypocalcemia

Causes?

Hypoparathyroid, hyperphos (CKD),
Vit D deficiency (malabsorption),
Loops, post-thyroidectomy

Presentation?

Chovstek's, Trousseau's, tetany,
seizure, prolonged QTc

Management?

IV calcium, telemetry, tx underlying
cause

Hypercalcemia

Causes?

Hyperparathyroid (1' + 3'), FHH,
Malignancy (PTHrP), Granulomatous
disease (via 1 α -hydroxylase), MM

Presentation?

Stones, bones, constipation, psych

Management?

- IV FLUIDS if symptomatic
 - Bisphosphonates if bone lesions
 - Maybe calcitonin

Miscellaneous

14-year-old boy presents with scrotal pain. Exam shows irregular mass above the testicle that enlarges with Valsalva and reduces when supine

Dx?

Varicocele

Next step?

Ultrasound

Most common side affected?

Left

What do you worry about w/ left sided varicocele?

RCC – HIGH YIELD, 90% angle of entry btwn gonadal and L renal vein

Tx?

Gonadal vein ligation if desiring fertility, if not OBSERVE

Risk if untreated?

Increased risk of infertility due to increased temperature

Miscellaneous

Patient presents with S/Sx of kidney stones, found to have hexagonal crystals in the urine.

Dx?

Cystinuria

Classic test?

Positive cyanide nitroprusside test

Pathophysiology?

COLA deficiency = decreased reabsorption of cysteine, ornithine, lysine, arginine from tubules

Tx?

Hydrate, alkalinize urine

Thanks for watching!

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